

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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| First Inventor: | Markus Dierker, et al.                                 | Examiner          | Brian M. Gulledge |
| Serial No.:     | 10/553,182   | Group Art Unit    | 1619              |
| Filed:          | July 21, 2006  | Docket No.:       | C 2647 PCT/US     |
|                 |  | Confirmation No.: | 2215              |
| Title:          | Poly- $\alpha$ -Olefin-Containing Cosmetic Composition |                   |                   |

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DECLARATION UNDER 37 C.F.R. § 1.132

I, Markus Dierker, Ph.D., hereby declare that:

1. I am the Head of Oleochemical Research - BASF Personal Care and Nutrition GmbH, which is owned by BASF SE. BASF SE recently acquired Cognis and the patent portfolio of Cognis IP Management GmbH, the assignee of the above-identified application. I earned a diploma in chemistry from the University of Muenster, Germany, and a Ph.D. degree (2001) in chemistry from the same University.
2. I have been employed by Cognis/BASF SE for the approximately ten years since earning my Ph.D. degree, with responsibility for research, development, design and problem solving in the area of poly- $\alpha$ -olefins and related hydrocarbon compositions. I am an inventor or co-inventor of about 23 granted United States patents and patent applications, many pertaining to these fields of chemistry.
3. I am a co-inventor of the above-identified application. I have reviewed this application, pending claims 12-29 and 33-34, the Final Office Action mailed on December 30, 2010 ("the Office Action"), U.S. Patent No. 6,464,967 (Collin '967), U.S. Patent No. 5,747,009 (Hansenne '009), and PCT Patent Application Publication WO 03/035707 (as the English-language equivalent Zander et al. US Patent Application Publication 2004/0267073). It is my opinion that Collin '967 does not either explicitly or inherently disclose the oil-in-water or water-in-oil emulsions claimed in claims 12-29 and 33 of the above-identified application, and that the unexpected experimental results discussed below establish that Hansenne '009 in view of Zander, et al. does not render obvious the invention claimed in claims 12-29, 33 and 34.
4. There is one independent claim (claim 12) presently pending in the application.

It is my understanding that after entry of the claim amendments to be submitted herewith in the Supplemental Response to the Final Office Action claim 12 will read as follows:

12. (Currently amended): A cosmetic composition which is an oil-in-water or water-in-oil emulsion comprising a mixture of poly- $\alpha$ -olefins poly- $\alpha$ -olefin oils produced by dehydrating polymerization at a temperature in the range of from 60°C to 340°C, in the presence of acidic alumino layer silicates, of at least one primary alcohol selected from the group consisting of

- a) unsaturated monofunctional alcohols;
- b) branched monofunctional alcohols; and
- c) difunctional alcohols,

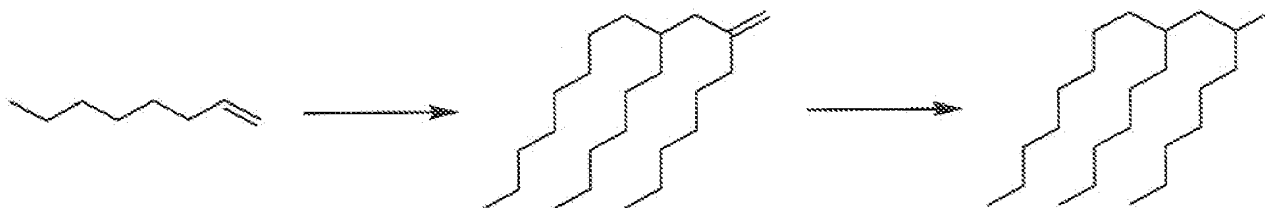
wherein said ~~mixture of poly- $\alpha$ -olefins~~ produced by dehydrating polymerization provide ~~provides~~ a cosmetic composition having improved storage-stability with respect to viscosity, ~~as well as storage stability with respect to~~ and separation, ~~versus the when compared to an~~ analogous cosmetic composition comprising poly- $\alpha$ -olefins produced by homopolymerization of  $\alpha$ -olefins.

The pending claims are directed to cosmetic compositions comprising poly- $\alpha$ -olefins produced by dehydrating polymerization at a temperature in the range of from 60°C to 340°C, in the presence of acidic alumino layer silicates. The reactants in the dehydrating polymerization reaction are primary alcohols selected from the group consisting of a) unsaturated monofunctional alcohols, b) branched monofunctional alcohols, and c) difunctional alcohols. This is in contrast to the conventional method for producing poly- $\alpha$ -olefins, which involves homopolymerization of  $\alpha$ -olefin (i.e., 1-alkene) monomers. It has now been unexpectedly discovered that poly- $\alpha$ -olefins produced according to claim 12 of the present application impart unexpectedly improved stability to emulsions, such as cosmetic compositions, as compared to poly- $\alpha$ -olefins produced in the conventional manner.

5. It is my understanding that the Examiner has rejected claims 12-29 and 33 as anticipated by Collin '967 on the basis that the claimed poly- $\alpha$ -olefins are the same as or obvious from the poly- $\alpha$ -olefins of Collin '967, even though the reference discloses cosmetic compositions comprising poly- $\alpha$ -olefins made by a method which is different from the method presently claimed. *See page 3, lines 9-14, of the Final Rejection.* It is also my understanding that the burden has now shifted to the applicant to provide evidence establishing that the claimed product and the prior art product are different. This evidence is provided and explained in the following paragraphs.
6. Collin '967 discloses methods for homopolymerization of  $\alpha$ -olefin monomers of general formula  $R-CH=CH_2$  wherein R is alkyl, preferably a linear alkyl radical. (*Column 2, lines 32-37*) Collin '967 is silent as to any specific alkyl structure for R other than linear alkyl. The cosmetic compositions of Collin '967 are mascaras which are wax-in-water emulsions (*Column 2, lines 10-15*). It is highly desirable for the poly- $\alpha$ -olefins to be in the form of a wax for application of the composition to lashes and other longitudinal keratinous fibers (*Column 1, lines 10-14; Column 1, line 44 – Column 2, line 9*). In view of this disclosure, it is my opinion that the skilled practitioner would interpret the general disclosure of  $\alpha$ -olefin monomers for use in homopolymerization reactions to mean only those  $\alpha$ -olefin monomers that produce the desired wax. Accordingly, Collin '967 does

not disclose the claimed cosmetic compositions in which the poly- $\alpha$ -olefins are the oil component of an oil-in-water or water-in-oil emulsion.

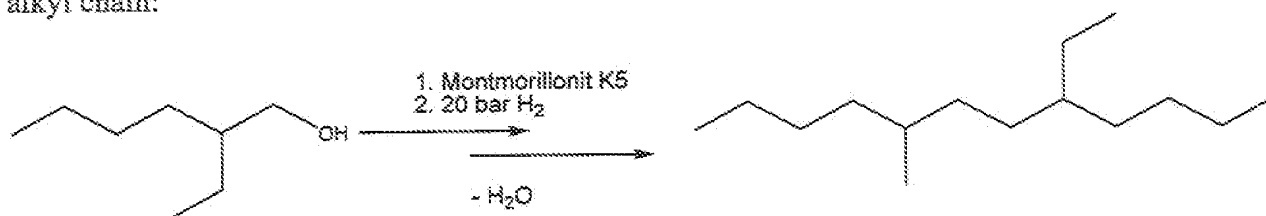
7. The structure of the poly- $\alpha$ -olefin waxes of Collin '967 is generally comb-like, with the carbon atoms of the olefin monomer forming the backbone and pendant linear alkyl chains forming the "teeth" of the comb.



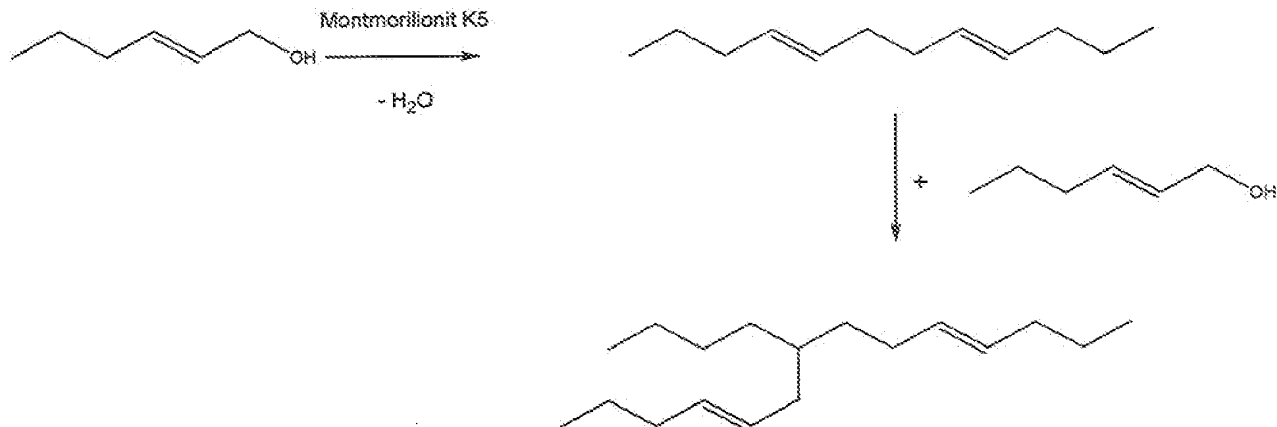
In contrast, the present invention provides poly- $\alpha$ -olefins which are oils characterized by branching or cross-linking in the pendant alkyl chains, as discussed in more detail below.

8. The backbone of the claimed poly- $\alpha$ -olefin oil molecule is formed in the dehydrating polymerization reaction by linkage of the carbon atom of the C-OH group of a first alcohol monomer to the carbon atom of a second alcohol monomer. In addition, there is branching or cross-linking within the pendant alkyl chains as a result of the structural characteristics of the primary alcohol monomer. The exact structural formula for the poly- $\alpha$ -olefins obtained by dehydrating polymerization cannot be readily illustrated because of the variability of branching and cross-linking of the alkyl side chains. However, the following illustrations are provided as a representation of the poly- $\alpha$ -olefin oils of the invention for purposes of comparison with the conventional poly- $\alpha$ -olefin wax disclosed by '967 Collin and illustrated above.

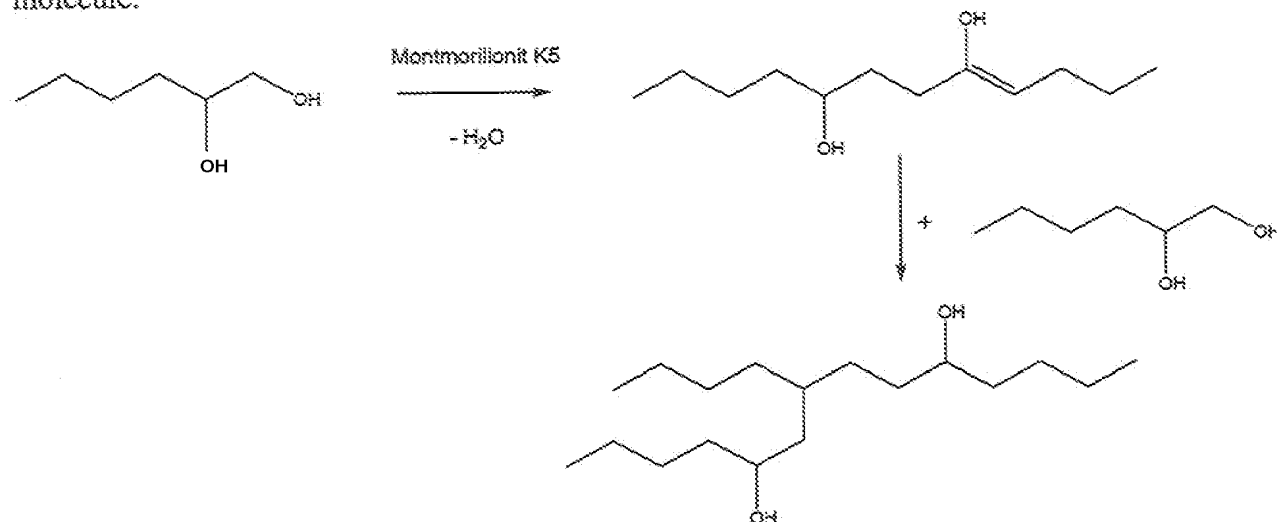
9. A branched monofunctional alcohol (claim 12(b)) directly produces a branched pendant alkyl chain:



An unsaturated monofunctional alcohol (claim 12(a)) produces a branched pendant alkyl chain by reaction of the double bond:



A difunctional alcohol (claim 12(c)) produces a pendant alkyl chain that is branched by cross-linkage of the carbon of the second OH-group to the carbon atom of a third alcohol molecule:



10. Branching or cross-linking in the pendant alkyl side chains of the poly- $\alpha$ -olefin oils of the invention results in physical properties that are substantially different from the poly- $\alpha$ -olefin waxes of Collin '967. First, the poly- $\alpha$ -olefin waxes of Collin '967 are solids at room temperature. They have melting points between 50°C and 80°C, preferably between 50°C and 60°C (*Column 2; lines 10-15 and 42-46*). In contrast, I have evaluated melting point analyses for the claimed poly- $\alpha$ -olefins and confirm that they are liquid at room temperature with melting points below 0°C. They are therefore oils, not waxes, and the significant difference in melting point is evidence of the substantially different branched or cross-linked chemical structure that is not present in the poly- $\alpha$ -olefin waxes of Collin '967.
11. I therefore conclude with respect to Collin '967 that the poly- $\alpha$ -olefin waxes disclosed therein could not be prepared using dehydrating polymerization of the alcohol monomers

recited in claim 12, because the branched or cross-linked structure of the resulting poly- $\alpha$ -olefin product produces an oil.

12. Accordingly, because '967 discloses only poly- $\alpha$ -olefin waxes for use in wax-in-water emulsions and because the poly- $\alpha$ -olefin waxes disclosed therein could not be prepared using dehydrating polymerization of alcohol monomers, it is my conclusion that claims 12-29 and 33-34 are not anticipated by Collin '967.
13. It is my understanding that the Examiner has rejected claims 12-29, 33 and 34 as obvious over Hansenne '009 in view of Zander, et al. on the basis that Hansenne '009 discloses cosmetic emulsions including an emulsifier for preservation and stability but does not disclose poly- $\alpha$ -olefins made by the recited process, and Zander, et al. disclose poly- $\alpha$ -olefins produced by the same process recited in the pending claims. It is concluded that it is *prima facie* obvious to select a known material (poly- $\alpha$ -olefin) for incorporation into a composition based on its recognized suitability for its intended use. Zander's disclosure that the poly- $\alpha$ -olefins exhibit improved resistance to oxidation is allegedly a suggestion that the stability of Hansenne's emulsion compositions on storage would be improved, i.e., that it would be *prima facie* obvious to use a poly- $\alpha$ -olefin with improved oxidation resistance in a formulation where stability is desired.
14. First, the reasoning of the rejection relies on a misinterpretation of the Zander reference. Resistance to oxidation of a poly- $\alpha$ -olefin refers to the stability of the poly- $\alpha$ -olefin molecule itself when exposed to thermo-oxidation conditions. The improved oxidation resistance of the alcohol-based poly- $\alpha$ -olefins reported by Zander, et al. is known to improve maintenance of the viscosity of the poly- $\alpha$ -olefin over time. It is not recognized in the art as a variable that has any effect on emulsion stability. Resistance to oxidation therefore does not suggest to the skilled person any particular effect with respect to the stability of an emulsion containing the poly- $\alpha$ -olefin, which is defined as the tendency of the phases to separate over time.
15. In my opinion, it was unexpected that the poly- $\alpha$ -olefin oils of the claimed invention provided improved emulsion stability as compared to conventionally-produced poly- $\alpha$ -olefins commonly used in cosmetic emulsions. This conclusion is confirmed by the experiment shown in Table 1 of the application (page 22), which compares the stability of a cosmetic emulsion comprising the poly- $\alpha$ -olefin oils made by dehydrating polymerization of a branched monofunctional alcohol ("isononyl oligomer hydrogenated") with a commonly used commercial poly- $\alpha$ -olefin prepared by homopolymerization of 1-alkenes (Nexbase® 2006FG). I have first-hand knowledge of these experiments and the results. The two compositions are identical except for the structure of the poly- $\alpha$ -olefin. That is, the isononyl oligomer is a branched poly- $\alpha$ -olefin as claimed and described above, whereas Nexbase® 2006FG is representative of poly- $\alpha$ -olefins with linear alkyl side chains as in the Collin '967 reference. I also note that Hansenne '009 specifically mentions use of poly- $\alpha$ -olefins of the polydecene type for use in the compositions (*Column 2, line 66-Column 3, line 2*) and that Nexbase® 2006FG is such a polydecene type poly- $\alpha$ -olefin.

16. The emulsion containing the alcohol-based poly- $\alpha$ -olefin (isononyl oligomer) and the emulsion containing the 1-alkene-based poly- $\alpha$ -olefin (Nexbase ® 2006FG) were evaluated for stability (i.e., separation) at room temperature (RT), -5°C, 40°C, 45°C and 50°C over a 12-week interval. Surprisingly, the emulsion stabilities were significantly different as early as 4 weeks. At all temperatures the 1-alkene-based poly- $\alpha$ -olefin emulsion had become unstable, whereas the alcohol-based poly- $\alpha$ -olefin emulsion was still stable. By 8 weeks the 1-alkene-based poly- $\alpha$ -olefin (Nexbase ® 2006FG) emulsion had separated at all temperatures, but the alcohol-based poly- $\alpha$ -olefin emulsion was still stable. The alcohol-based poly- $\alpha$ -olefin emulsion was still stable at all temperatures when the experiment was terminated at 12 weeks. The extended stability of the alcohol-based poly- $\alpha$ -olefin emulsion composition compared to the 1-alkene-based poly- $\alpha$ -olefin emulsion composition represents a significant improvement in emulsion stability.
17. It is my opinion that the significant improvement in emulsion stability obtained when substituting an alcohol-based poly- $\alpha$ -olefin for a conventional 1-alkene-based poly- $\alpha$ -olefin was unexpected. Based on my expertise in this field, I believe the improved emulsion stability is related to the branched or cross-linked structure of the alcohol-based poly- $\alpha$ -olefins claimed. To my knowledge, the effect of branching or cross-linking in poly- $\alpha$ -olefins on emulsion stability has not previously been recognized in the field of poly- $\alpha$ -olefin technology.
18. My conclusions with respect to the combination of '009 Hansenne with Zander, et al. are as follows: '009 Hansenne discloses the use of poly- $\alpha$ -olefins in cosmetic emulsion compositions that are of the Nexbase® 2006FG type. Although Zander, et al. describes the alcohol-based poly- $\alpha$ -olefins used in the claimed cosmetic compositions, this reference does not teach or suggest that the alcohol-based poly- $\alpha$ -olefins will have any effect on emulsion stability that is different from a conventional poly- $\alpha$ -olefin produced by homopolymerization of 1-alkenes.
19. In view of the unexpected experimental results discussed above, and the failure of oxidation stability of a poly- $\alpha$ -olefin to suggest improved stability of an emulsion containing that poly- $\alpha$ -olefin, it is my conclusion that claims 12-29, 33 and 34 are not obvious over Hansenne '009 in view of Zander, et al.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patents that may issue thereon.

31.10.2011

Date



Markus Dierker, Ph.D.